Technology Integration into Physical and Health Education

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Abstract: Within the context of this article, a brief understanding of both Physical and Health education within the United States is created. Furthermore, this paper seeks to circulate the discussion around implementing technology into these fields of Education including wearable watches as well as their strengths and limitations. One particular area of concern with the usage of wearable technology in Physical Education is the laws surrounding privacy and data collection such as FERPA and HIPPA. The paper also discusses the use of gamification and simulations in both subjects.

Keyword; (Education, Physical Education, Health Education, Technology)

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Introduction

Amidst the infinite expansion of the digital age, the landscape of education has grown to keep up with the advancement of technology. Moreover, school districts and universities have been spurred by Covid-19 to provide education from a distance. In particular, Synchronous learning, where students and teachers learn by meeting online at specfic times via Video conferencing systems (i.e. Zoom and WebEx) and Asynchronous learning, where students learn through recorded lectures and other Instuctional content without meeting with the instuctor at all (students still can attend office hours virtually and comminicate by email).

In the last year or so, Hybrid learning has also become an option as covid cases went down and vaccines had become widely available to individuals. Hybrid learning has been popular in K-12 schools since students learn remotely for a few days while the remain days are in-person. Depending on the school, students might learn in-person three out of the five days a week while two days are fully online. This system is particularly useful for schools to ensure they meet the state standerds for Physical Education (PE) which is difficult to teach fully online.

This paper seeks to document how technology can be integrated into the classroom (virtual and physical) specifically explore how technology can be utilized in Physical education classrooms. Within the scope of the article, 'Technology' refers to the use of web-based software, mobile software applications, wearable technology such as a Fitbit, and in somecases games that promote Physical activity such as Ring Fit Adventure. I will touch on a number of topics including a general overview of physical education, and why it is important, how teachers had taught PE remotely, technology we can use to both engage students and help them better understand how certain exercises affect their bodies, create an awareness for physical activities, and possible concerns that may arise from using technology in the physical education classroom.

The Importance of Physical and Health Education

Due to Fast food being affordable and quick, it has never been easier to order in a heap of burger combos, pizzas, and tacos. In Fact, companies such as McDonald's, Dominos, and Taco Bell have been dotting the landscape from mile to mile. According to Benjamin Sawe, in their 2019 Worldatlas article titled, How Many McDonalds Locations Are There In The World, "MacDonald's] has an estimated 36,889 outlets across 120 countries.. [and] the United States is the leading country with the most McDonald's restaurants at 14,146 [stores]" (Sawe, 2019). Moreover, Sawe notes that Japan and China have the next largest number of stores (per country) at 2,975 (Japan) and 2,391(China) respectively (Sawe, 2019). The number of McDonald's Restaurants in America alone is more than five times(5x) China's number of McDonald's restaurants. Additionally, Fast food made quick and sold for cheap doesn't mean it is good for people to eat on a daily basis. Specifically, Nutrition and Health experts note that balancing between active and inactive calories is important for maintaining a healthy body. Scott Howell and Richard Krones in their 2017, journal article titled, Calories in, calories out" and macronutrient intake: the hope, hype, and science of calories, highlighted the relationship between calories, weight loss and exercise.

> Calories "in," consumed in food, are self-explanatory. Calories "out" consists largely of resting energy expenditure (REE), the energy requirement or basal metabolism of the body "at rest" in the absence of external work…The second component of calories out is physical activity, which may be considered the sum of basal activities of daily living and purposeful physical activity, or "exercise." The third, and typically the smallest, component of total energy expenditure is the thermal effect of food (TEF, or diet-induced

thermogenesis). TEF is the energy associated with a postprandial rise in metabolic rate and covers energy expended to process food (Howell & Krones, 2017).

A less technical explanation of the Calorie in, Calorie out framework is as followed: Resting Calories (also known as inactive calories) are calories gained from mainly from eating and drinking food. Active Calories are calories that are burned by engaging in physical activites such as walking (either casually or purposefully) and exercising. Finally, Calories can also be used naturally to process foods and do simple bodily functions such as keep your heart beating.

Obesity, among other serious health issues like type-2 diabetes and hypertension such as stem from eating large amounts of fast food and a lack of physical activity. Lisa Young and Marion Nestle, in their 2007 journal article titled, Portion Sizes and Obesity: Responses of FastFood Companies, stated that: “Large portions contribute to overweight in three ways: they provide more calories, than smaller portions encourage people to consume significantly more calories and to greatly underestimate those calories” (Young & Nestle, 2007 p.239). The extra calories consumed by a person builds up in their bodies which are then converted into fat and sugars depending on the food eaten which contributes to obesity when individuals do little to no physical activity. Howell & Krones, in the same article referenced above, asserts that “physical activity “…accounts for 60-70 % of total calorie expenditure” while TEF is less than “10% of the total calorie expenditure” (Howell & Krones, 2017 p.608).In other words, not exercising daily results in about 60 to 70% of the total calories consumed to stay stored into the body as fat. Improper knowledge of nutrition and not monitoring calorie, are only two factors that contribute to obesity. Jacob Seidell and Jutka Halberstad, in their literary review of titled, the Global Burden of Obesity and the Challenges of Prevention, note that varying factors combine to

exacerbate the issue. They mention economic factors such as food price and cultures where fast food awareness is aggressively promoted and eating out with friends or coworkers is the social norm. (Seidell & Halberstad, 2015). These factors can strongly influence what adults eat and then trickle down to children who don't usually think about health and fitness as much as oder adults that develop serious medical conditions as a result of poor nutrition and lack of fitness following their graduation of the mandatory physical education curricula. When it comes to Childhood obesity, simply exercising daily is not enough to prevent it.

Global Overview of Physical and Health Education

Physical Education is often described as the education of physical movement such as , whereas Heath Education is the education of topics such as Puberty, Sexually Transmitted Diseases (STDs), Drugs, and Nutrition. The Society of Health and Physical Educators (SHAPE America), IN conjunction with the Joint Committee on National Health Education Standards. loosely define Physical and Health Education in the form of their national standerds. Based on their standerds Students learn the following: Disease prevention, how people (friends, family, ect.,) and technology and media influence a person's health decisions, Commination skills and strategies that promote healthy choices and mitigate health issues, use methods such as goal setting to maintain healthy habits and communicating positive habits to other individuals. (JCNHES, 2007).

In essence, Health education is about understanding how what are good habits to stay healthy and learn ways to maintain those habits. The above paraphrase of the national health standerds while seemingly concrete fail to point out specificities of what students need to understand and thus allows educators to craft curricula that goes into large detail on one or two subjects, yet very little on other subjects. An example would be that student learn about

substance abuse, but the curriculum does not feature information on dieting. While learning about substance abuse is important, students should also learn about the strengths and weakness of varying diets which may educate students on what essential nutrients they might be missing.

Separately, SHAPE outlines Physical Education curricula using a different set of national standerds. Students learn the following concepts: How to preform different forms of motor skills such as a plank or push-ups, Student understand strategies improve their performance, and that they understand the worth of physical exercises in a variety of ways such as teamwork (SHAPE America, 2013). While there is a general understanding of both PE and Health education worldwide, the exact definitions vary between countries. In the United Kingdom, the Association for Physical Education (AfPE) collectively consider PE as "The planned, progressive learning [which] involves both "learning to move" (i.e. becoming more physically competent) and "moving to learn" (e.g. learning through movement, a range of skills and understandings beyond physical activity, such as co-operating with others)". (AfPE, 2015 pp.3)

The International Council for Health, Physical Education, Recreation, Sport, and Dance (ICHPER•SD), which is affiliated with United Nations Educational, Scientific, and Cultural Organization (UNESCO) define both Physical Education and what it means to be "Physically Educated" (ICHPER•SD, n.d.) on their website. They state that:

> Physical education is comprised of two major components: human movement and physical fitness (motor and health-related); and is based on the following disciplines: motor learning, motor development, kinesiology, biomechanics, exercise physiology, sport psychology, sport sociology, and aesthetics…. A physically educated person HAS learned skills necessary to perform a variety of physical activities; IS physically fit; DOES participate regularly in physical activity; KNOWS implications of and benefits

> from involvement in physical activities; and VALUES physical activity and its contributions to a healthful lifestyle. (ICHPER•SD, n.d.).

In contrast, to SHAPE America and ICHPER•SD's interpretations of PE, AfPE focuses solely on teaching kinesthetic movement rather than a combination of teaching how to preform exercises and strategies for endurance. It is because PE is a broad subject spanning several disciplines, that educators can only teach so much information in their courses. Moreover, enrolling in physical education classes does not always mean that students will be 'physically educated' since individuals need to be "Physically fit" and 'participate regularly in physical activity" (ICHPER•SD, n.d.). While it is likey that some some number of children do meet the definition proposed by ICHPER•SD, a vast majority of children do not. The World Health Organization notes that:

> In 2019, an estimated 38.2 million children under the age of 5 years were overweight or obese…In Africa, the number of overweight children under 5 has increased by nearly 24% percent since [2000, and almost] half of the children under 5 who were overweight or obese in 2019 lived in Asia" (WHO, 2021 para. 6).

The above quotation is significant as it underscores the discrepancy between those who are 'Physically Educated' and those who are not. Ideally, Physical Education would eliminate obesity and the health issues that come with it by instilling children with the means and ways to stay active in and out of the school. However, knowing how to be active is not the same as being active. Moreover, teaching PE became impossible for educators and schools durring the Covid-19 pandemic furthered exacerbating the obesity worldwide.

Physical and Health Education in COVID -19

As schools closed down their physical classrooms durring the pandemic, the question for many schools in the K-12 system was how educators would teach PE remotely. In particular the biggest concern surrounding online education overall is social presence. Social Presence, along with Cognitive and Teaching Presence, respectively, are all part of a educational framework known as The Community of Inquiry (CoI) and created by Zehra Akyol and Randy Garrison, in their article titled The Development of a Community of Inquiry Over Time in an Online Course: Understanding the Progression and Integration of Social, Cognitive and Teaching Presence. Akyol & Garrison, (2008) defined the three types of presence as

> [Social presence being defined as] affective expression, open communication and group cohesion. Cognitive presence was defined by the practical inquiry model and consisted of the phases—triggering event, exploration, integration, and resolution. Teaching presence was defined in terms of design, facilitation and direct instruction' (Akyol & Garrison, 2008 p.4).

The idea behind social presence is for teachers to determine is a student is activly engaged in the course. Moreover, being engaged is more than simply attending class either physically or virtually. Students must demonstrate that their levles of understanding by engaging in discussions, asking questions, and completing assignments. Due to the nature of remote learning particularly Asynchronous learning, many educators were unsure of how engaged students were in the class when students and teachers did not meet regularly or at all. Given that physical education (as aforementioned above) is where students preformed kinesthetic movement and demonstrate related skills such as running a specfic distance in a particular timeframe, teachers would not be able to measure their students' abilities as they typical would. An example of this is

the Progressive Aerobic Cardiovascular Endurance Run (PACER) Test, where student run back and forth between a set distance in a limited amount of time. Moreover, the length of time between each round become shorter as the test continues. Students are scored based on how many time the go back and forth. If a student fails to reach the specified distance in the griven time, then the number of completed runs becomes their score, hence the term 'progressive endurance'(Fitnessgram, n.d.). In order to effectively do this exam, students need to be in a large space such as a gymnasium. Naturally, with covid-19 the test was not a viable option. In fact, the State of California, on March 13th, 2022, temporality stopped requiring PE teachers to adhere to their physical Education standerds.

> The requirements specified in Education Code sections 5121 0(a) (7), 51220(d), 51222, and 51223, related to minimum instructional minutes in physical education for grades 112 … and the requirement specified in Education Code section 51241 (b) (2), related to providing adequate facilities for physical education courses, Education Code sections 33352(b)(4) and (5), requiring the California Department of Education to collect data regarding for the administration of the physical fitness test, are waived for the 2019-20 school year. (Executive Department State of California, 2020). The situation is much worse when you consider the number of low income and minority students who depend on free/reduced lunches for a healthy diet.

Technology integration into Physical Education

To teach their students, educators had to utilize technology such as Learning management systems (LMS), Video-Conferencing tool such as Zoom, Fitness application such as Samsung health, and Wearable technology such as fitness trackers. Surprisingly, some instructors had even used social media to get students engaged, as noted by

Vilchez, et al. in their paper titled, Teachers and School Health Leaders' Perspectives on Distance Learning Physical Education During the COVID-19 Pandemic.

> Teachers creatively reworked their lessons, offering movement-based activities that required little to no equipment such as yoga, dance, martial arts, and reflection-based activities that focused on social-emotional learning such as journaling and meditation. Social media platforms such as YouTube, Instagram, and TikTok facilitated the delivery of physical education (Vilchez, et al, 2021 p.545).

Moreover, PE instructors had to quickly alter their typical educational content to be inclusive of students who did not have any exercise equipment. Teachers can engage students by requiring them to attend Zoom or other web conference meeting and grade students based on participation. For this to be effective, students would have to: 1. have access to a computer, tablet, or similar device in which they can access the meeting in real time, and 2. Demonstrate participation of the required activites via cameras embedded into computers or similar devices. By requiring participation virtually, teachers can satisfy their need to see student engage In physical activites as opposed to simply telling student to exercise. Another less effective alternative would be for PE teachers to require students to record themselves engaging in specfic exercises such as Push-ups, Jumping Jacks and other aerobics exercises. (Centeio et al, 2021). Again, teachers would then be able to see the students preform the exercise and thus establish that the students did the assignment. Brandon Foye and Michelle Grenier, in their article titled, Teaching during a pandemic: Physical educators' reflections on teaching remotely, conducted a study of how educators in New England felt teaching PE online. Foye and Grenier Found that most of the teachers avoided synchronous sessions such as zoom calls in favor of quiz videos that indicate the activites due for the week.

> Teachers would post a combination of: self-produced videos or internet links to assignments students could complete (typically age-appropriate home workouts on YouTube, GoNoodle, or similar programs… teachers typically focused on greeting their students, providing a brief description of the activities for the week and adding a motivational component, rather than attempting to provide detailed skill cues (Foye & Grenier, 2021 p.140).

Valeria Varea and Gustavo González-Calvo, in their article titled, Touchless classes and absent bodies: teaching physical education in times of Covid-19, highlighted how Physical education educators taught online in Spain. Pre-service PE teachers "Were requested to prepare videos, tutorials, physical activities and other activities, so that school students could work on them from their homes" (Varea & González-Calvo, 2020 p.834), however Varea et al., 2018 indicated that Spain is a country that has a "..high-proximity culture and where pre-service PE teachers consider physical contact with students normal and expected (as cited in Varea & GonzálezCalvo, 2020 p.833). Sweden's approach to education durring Covid-19 is strikingly similar to pre-pandemic PE classes. In fact, Sweden opted to not only keep their schools open, but PE classes were outright In-person rather than online.

> Despite recommendations to limit close physical contact in schools during COVID-19 times, Anna still chooses to engage in physical contact while teaching gymnastics to avoid students getting injured. In so doing, Anna is weighing up and managing the risks (i.e. contracting the COVID-19 virus vs. students getting hurt), as not being at risk is just not an option. In addition to physically assisting students in exercises, PE teachers also occasionally administer appropriate physical contact to develop a good relationship with students (Kamoga & Varea,2021 p.268).

Ultimately, in countries where the government had issues lockdowns of schools, workplaces and gatherings, schools typicaly had PE teachers work remotely. Most teachers utilized video recordings to engages their students at home, but synonymous sessions via video-conferencing tools were occasionally used by some educators. Overall theywere either not preferred or avoided completely as teachers struggled to come to terms with virtual PE classrooms. Most surprising was that select countries opted to continue teaching in-person. Regardless of the learning mode (i.e. in-person, online, or hybrid) technology can implemented into Physical and Health education using a wide variety of methods.

Suggestions for effective Technology Integration in PE

Technology can also be integrated into physical gym classes that follow a hybrid model. Using the SAMR model, devised by Ruben Puentedura, educators can categorize technology into four major categories of technology integration. (as cited in Chakin & Trail, 2019 p.47). Educators can engage student by having students preform various exercises at different stations. One station in particular can include exercise games such as Nintendo's Ring Fit Adventure, which through was designed for fitness. Ring Fit Adventure allows the consumer to preform a wide range of physical activites including Aerobic exercises such as jogging, strength building exercise such squat, and yoga (Lu et al, n.d.). Additionally, Ring Fit strongly emphasizes the importance of proper form as specfic game mechanics will not function unless the users properly preforms the exercise. Using gamification can be a great way to a engage students particularly, young ones, into getting a workout without the hyperawareness of typical exercises. Within the SAMR model, Ring Fit Adventure would allow for modification of instuction since users can perform specfic exercises by selecting a particular mode, and be prompted to practice proper form, students do not need to be supervised as often. Aside from Ring Fit Adventure, popular games under the EA sports label (Madden and FIFA) could allow PE teachers to better instruct student on several formations and plays by simulating them. Madden is a prime example as the game

features a number of playbook options, depicts player routes(where the play should run on the field) and locates the line of scrimmage in a visually striking way. Students might find this approach easier to follow as opposed to verbal explanations and abstract figures drawn by hand.

Conversely, Wearable technology such as Fitbit and Garmin watches allow users to track their daily physical activity. These watches allow users to record specfic exercises such as running, swimming, weightlifting, and meditation. Moreover, the devices count steps with a built-in pedometer, track calories, and more. Garmin Watches also show users which muscles of their body were activated allowing for users to target specfic muscles intentionally. Educators their could utilize those app functions to gain a deeper understanding of their student abilities. Additionally, wearable technology counts the number of reps the user preformed eliminating the need for users to self-repot their resuts or guess after losing count. The information is synched to the user's phone. Another feature is that wearable tech often encourages users by using a reward system. By completing specific achievements such as breaking a pervious record, users continue to be motivated. Similarly, Garmin watches allow users to challenge others in activites such as running the most distance. These challenges potentially open new doors to preformance assesments PE teachers typically use, while promoting social connectivity. Wearable technology also holds the potential to significantly redefine how teachers engage students outside of school hours. The CDC recommends the use of CSPAP (Comprehensive School Physical Activity Programs) which they have created as a way to better ensure student meet the recommended number of exercise minuets. According to the CDC, CSPAP has five core elements: Physical Education, Physical Activity before and after school, Staff involvement, and Family and community support, (CDC, 2019). By adopting wearable technology in the same capacity as Chromebooks and iPads, schools can implement policies where schools loan students' technology for educational purposes, educators can promote physical activity beyond the mandatory physical education instuction in schools which might

lead to overall better lifestyle choices.PE teachers could even ask student to do ’homework’ such as preforming exercises at home or maintaining a certain number of intensity minutes per week. Students would maintain an awareness of their physical activity and health by having access to the apps that records information such as sleep and stress, and thus take action to implement health choices. Other fitness applications allow user to keep track of and build a custom diet that is nutritious. If used in conjunction with wearable technology, student would gain a better understanding of ways they can eat healthier or substitute items that are fattening. It is for those reasons that wearable technolgy would be categorized as Redefinition technology using the SAMR model, since it has the potential to change how student do physical activities.

Concerns over data privacy and other potential Issues’

Of Course, anytime technology is utilized in a classroom, strict policies must be enactied to ensure confidentiality and security of personal information. This is especially true when minorities are involved. The Health Insurance Portability and Accountability Act (HIPPA) require individuals to control who has accese to their medical information, what information is shared, and requires that effective steps and precautions be taken to ensure that the data remains secure and private (Edemekong et al, 2022). In the case of using wearable technology, teachers will have to be careful about information if the school decides to enact a policy where students submit reports to their teachers on what physical activities they have completed.

Moreover, working with technology requires that educators understand the disparity in access to technology, reliable and stable internet connectivity, and exercise equipment among low-income and minority students in comparisons to other students (Gao & Hayes, 2021). These student are disadvantaged in comparison to students for background with greater financial security, and

therfore students might be susceptible to obesity and other health conditions due to overindulgence of cheap unhealthy foods, and are less likey to have access to wearable technolgy such as Garmin watches and Fitbits which potentially promotes fitness by increasing awareness of one's physical and mental health (i.e. Step count, calories, Stress).

Conclusion

Within this article, I had discussed current issues in the field of Physical and Health Education, touched on how teachers had to adapt their instuction during the covid-19 pandemic to best suit the need of their students, briefly informed on how Pe teachers utilized technology to engage students while schools were closed down, and suggested ways to further integrate technology into the PE classroom. Issues within physical education suggest that educators are not incorporating a balanced curriculum between health and physical education nor are they able to meet the varied guidelines set forth by organizations such as the CDC and WHO, which may have been further distorted by the ambiguity of physical education worldwide. Annother aspect may be due to deep cultural ties to specfic habits which are regularly promoted (in a number of ways) that severely influences a person’s lifestyle choices. That said, integrating technology into schools which promote fun or awareness of one’s physical activites can positively influence how a person chooses what to eat and how much to exercise. Regardless of the fact that some individuals stuggle with access to technology, educators, especially PE teachers, have the ability to integrate them into course making us a step closer to reducing the digital divide and equipping students with tools to live healthy lives.

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